REMARKS

In order to expedite the prosecution of the present application, Claims 5, 7, 8 and 10-15 have been canceled and replaced by newly presented Claims 16-19 which more particularly point out and distinctly claim the subject matter which Applicants regard as the invention. No new matter has been added.

Claims 5, 7, 8 and 10-15 have been rejected under 35 USC 103(a) as being unpatentable over Hata et al. Claims 5, 8 and 11-15 have been rejected under 35 USC 103(a) as being unpatentable over either of the patents to Ishida et al and Claims 7 and 10 have been rejected under 35 USC 103(a) as being unpatentable over either of the patents to Ishida et al in view of Hata et al. Applicants respectfully traverse these rejections and urge reconsideration in light of the following comments.

The presently claimed invention is directed to a thermally sensitive recording medium comprising a thermally sensitive color developing layer formed on a substrate. The thermally sensitive color developing layer comprises a colorless or pale-colored basic leuco dye and a color developing agent as main components. The thermally sensitive color developing layer further comprises an acrylic polymer which is obtained by copolymerizing an acryl acrylate, an alkyl methacrylate and a vinyl silane, and further contains a colloidal silica possessing a chain structure. The content of the colloidal silica is 10-300 weight parts to 100 weight parts of the acrylic polymer.

As discussed previously, the thermally sensitive recording medium of the present invention has an excellent water-resistance, good printing aptitude and sealability and is characterized by having less accumulation of dregs on a printing head. This makes it especially suitable for outdoor use as a handy terminal paper or a delivery slip. The advantageous properties associated with the thermally

sensitive recording medium of the present invention is achieved by the combination of the claimed acrylic polymer and colloidal silica. It is necessary that the blending amount of the colloidal silica is 10-300 weight parts to 100 weight parts of the acrylic polymer. When the amount of colloidal silica is too small, the adhesion of dregs on a head or sticking are caused and when the amount is too large, the stability of a coating of the thermally sensitive recording layer over time becomes a problem. It is respectfully submitted that the prior art cited by the Examiner does not disclose the presently claimed invention.

The Hata reference discloses a heat-sensitive recording body comprising a heat-sensitive recording layer containing a colorless or light-colored basic dye, a color developing agent and an adhesive on a substrate. In the heat-sensitive recording layer, as the adhesive, a composite body of a colloidal silica and an acrylic polymer or a styrene/acrylic polymer and an emulsified and dispersed stearyl amide are present.

In contrast to Hata et al, in the present invention the colloidal silica and the acrylic polymer are not present as a composite body, as is required in the Hata et al reference. As discussed in the first paragraph on page 9 of the present specification, in the case of a complex or composite body particle type in which colloidal silica surrounds an acryl polymer are strongly bonded by a polymerization bond, when it is used as a binder for a thermally sensitive layer, fusing or contacting of the acryl polymers to each other become difficult due to the presence of the colloidal silica and the film-forming ability becomes obstructed. In contrast thereto, in the present invention where the acryl particles and colloidal silica are not added in the form of a composite, the colloidal silica combines with the acryl particles weakly by absorption and do not obstruct film formation caused by the acryl particles to each other. This enables a strong film to be formed so that the water-resistant property is improved.

Moreover, the good film-forming ability results in the strength of the thermally sensitive recording layer being improved along with the printing aptitude.

Comparative Example 3 on page 30 of the present specification corresponds to the disclosure of Hata et al in that an acrylic emulsion/colloidal silica composite resin was used in place of the acrylic polymer and colloidal silica of the present invention.

A comparison of the results in Table 3 on page 33 of the present specification between Example 1 and Comparative Example 3 illustrates that the thermally sensitive recording medium of the present invention is clearly superior to that of Hata et al with respect to water resistance, printing aptitude and dregs on a printing head. This is clearly unexpected in light of the disclosure of Hata et al and establishes the patentability of the presently claimed invention thereover.

Similar to Hata et al, the Ishida et al references disclose a heat-sensitive recording material comprising a substrate and a heat-sensitive recording layer thereon containing a colorless or light-colored basic dye. The recording layer also contains an emulsion containing complex particles of colloidal silica and at least one of an acrylic polymer and styrene-acrylic polymer is added to the coating composition for the recording layer. As discussed above, the complex particles of colloidal silica and the acrylic polymer produce a heat-sensitive recording material that corresponds to Comparative Example 3 in the present specification and is inferior to that of the present invention with respect to water-resistance, printing aptitude and dregs on a printing head. Therefore, for the same reasons discussed above, the presently claimed invention is clearly patentably distinguishable over Ishida et al, singularly and in combination with Hata et al.

A Declaration Under 37 CFR 1.132 is of record in which additional test data is presented which compares a thermally sensitive recording medium according to the present invention

with additional comparative recording mediums prepared according to the disclosure of Hata et al.

The Examiner has stated that the type of silica is not the only variable in Example 1 and Comparative Example 3 and that it appears that twice as much acrylic polymer/silica is employed in Example 1 as in Comparative Example 3. The 37 CFR 1.132 Declaration presents additional test data in which the spherical colloidal silica content and the acrylic polymer content are increased. As can be seen by the results in the Declaration, in revised Comparative Examples 3' and 3", in which the amount of silica and acrylic polymer was increased closer to that of Example 1 of the present application, the water resistance, printing aptitude and dregs on a head were inferior to that of the present invention. Additionally, the color developing sensitivity was also inferior to that of the present invention.

Also of record is a document providing technical information about the colloidal silica composite synthetic resin emulsion used in Hata et al. As pointed out previously, where the silica and acrylic polymer are present as a composite or complex body particle type in which colloidal silica surrounding an acryl polymer, are strongly bonded by a polymerization bond, when it is used as a binder for a thermally sensitive layer, fusing or contacting of the acryl polymers to each other is hindered due to the presence of the colloidal silica and the film-forming ability is reduced. On the other hand, in the present invention where the acryl particles and colloidal silica are not added in the form of a composite, the colloidal silica combines with the acryl particles weakly by absorption and do not obstruct film formation between the acryl particles. This allows for the formation of a strong film so that the water-resistant property is improved along with the strength of the thermally sensitive recording layer and the printing aptitude. This is clearly unexpected in light of the prior art cited by the Examiner and establishes the patentability of the presently

claimed invention thereover. Favorable consideration is respectfully solicited.

Respectfully submitted,

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